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(54) **Powered brush**

(57) A powered brush in the form of an electric toothbrush is described. The brush has a head 14 which carries a number of movable tufts 26. Each tuft 26 is carried by a pinion wheel 28 and the tufts 26 are grouped together into two rows A and B. Each pinion wheel 28 of a row is coupled to its neighbour(s) in the row.

Drive means in the form of a shaft 34 extends between the rows A and B and is coupled to the central tuft 26 of each row by a worm wheel 36 and Archimedes spiral gear 32 (not shown).

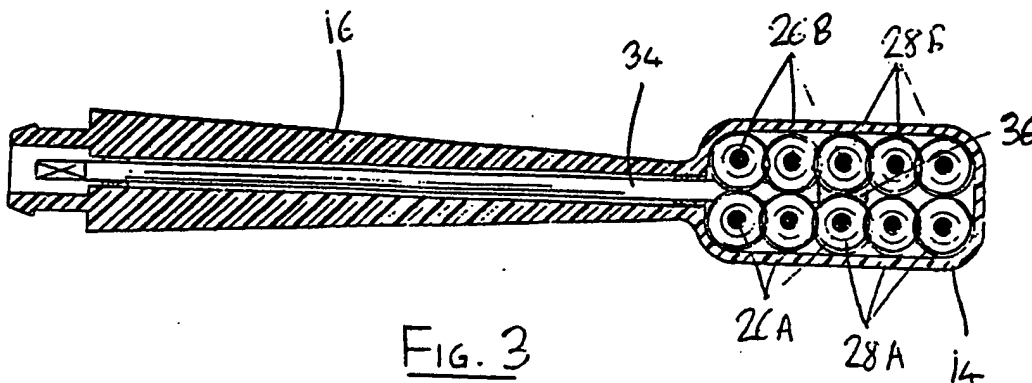


FIG. 3

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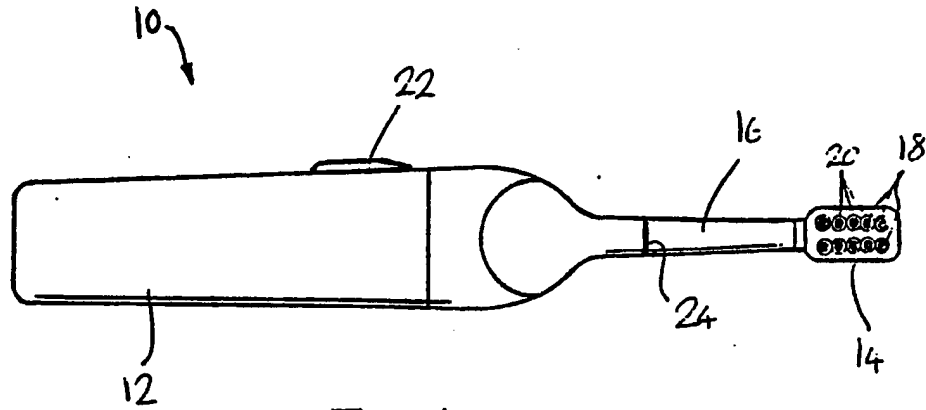


FIG. 1

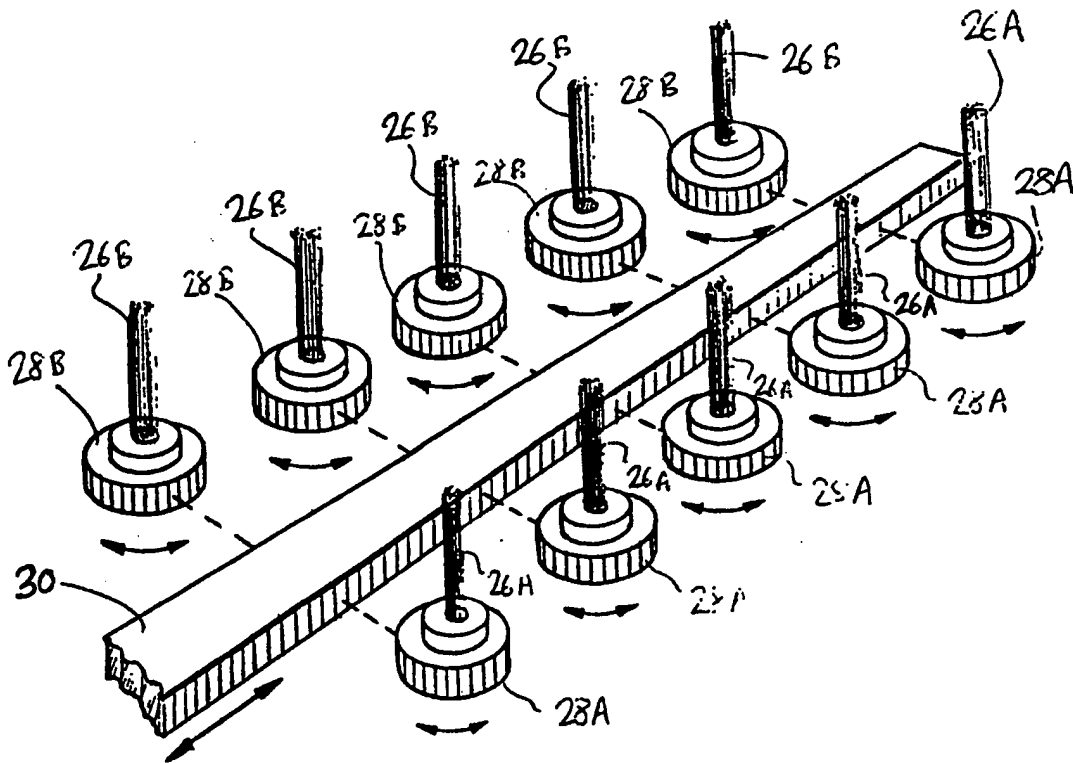
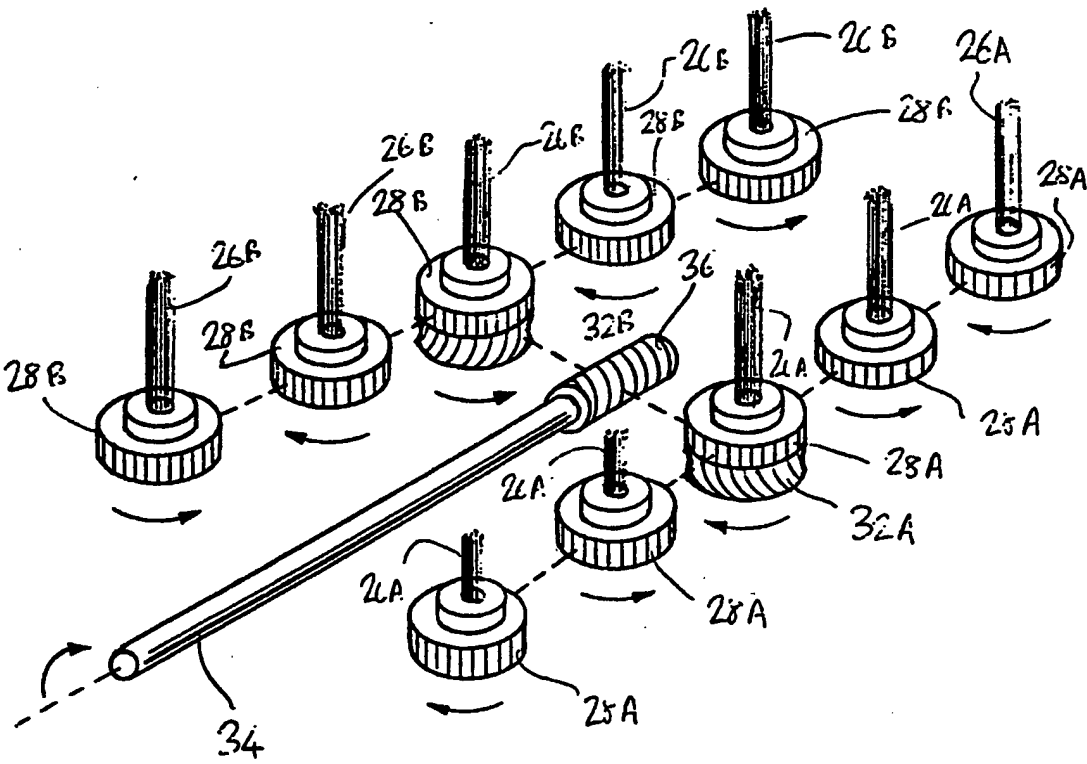
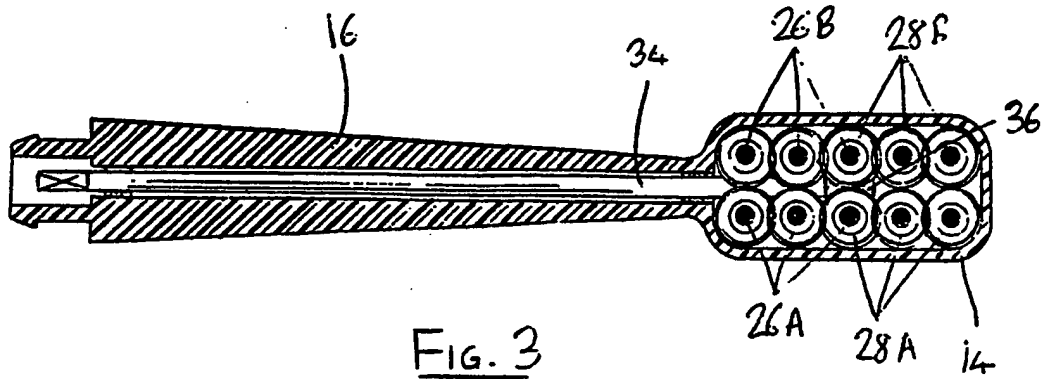


FIG. 2



IMPROVEMENTS IN AND RELATING TO POWERED BRUSHES

5 This invention relates to powered brushes, more particularly, though not exclusively, to electric toothbrushes.

10 Electric toothbrushes generally comprise a head and an enlarged handle, which are connected to one another by a stem. Several tufts of bristles are movably mounted to the head and the tufts are driven in use by a motor situated within the handle, via an elongate drive member extending through the stem. The movement of the tufts serves to clean the user's teeth.

15 In a known arrangement, rows of tufts are pivotably mounted to the head and each tuft has an associated pinion. The drive member terminates in a rack which is driven in oscillatory fashion by the motor. Each pinion is coupled to the rack and thus each tuft turns  
20 first clockwise and then anticlockwise as the rack moves to and fro.

25 The known arrangement described above suffers from several disadvantages. For example, the oscillatory movement of the rack gives rise to vibrations, which makes the toothbrush uncomfortable to hold in use. The vibrations also lead to wear and to reduced reliability. Moreover, all tufts in each row move in unison, in the same direction as one another. This  
30 gives an inefficient brushing action.

35 The principal object of this invention is to overcome or at least to mitigate the disadvantages of known powered brushes, particularly electric toothbrushes.

With this object in view, we propose a powered brush head comprising one or more movable tufts, wherein the  
or each tuft is drivable by rotary drive means for  
rotary motion relative to the head.

5

This invention thus obviates oscillatory movement and thereby avoids vibration.

10

In a preferred embodiment of the invention, the brush head has a group of tufts coupled to one another for transmission of drive through the group, at least one tuft of the group also being coupled to the rotary drive means. Conveniently, each tuft of the group has an associated pinion wheel and the coupling between  
15 respective tufts of the group is effected by meshing between the respective associated pinion wheels. This arrangement is simple, cheap to produce, and reliable.

20

It is also preferred that each tuft of the group rotates in use in a direction opposite to the neighbouring tuft or tufts in the group. This gives an efficient brushing action.

25

In an advantageous embodiment, the brush head has at least two groups of tufts, at least one tuft of each group being coupled to common rotary drive means. Thus, a single rotary drive means can be used to drive  
30 two or more groups of tufts, with benefit to simplicity and compactness.

30

In order that this invention may be more readily understood, reference will now be made, by way of example, to the accompanying drawings in which:

35

Figure 1 is a side elevational view of a toothbrush in accordance with this invention;

Figure 2 is an exploded view of a prior art toothbrush head arrangement;

5      Figure 3 is a sectional view showing a portion of Figure 1 in detail;

Figure 4 is an exploded view of a toothbrush head constructed in accordance with this invention;

10      Referring to Figure 1 of the drawings, an electric toothbrush 10 constructed in accordance with this invention is outwardly similar in layout to known devices. Thus, the toothbrush 10 comprises a handle 12 and a head 14, which are connected by a stem 16.  
15      The handle 12, head 14 and stem 16 are each of plastics material.

The head 14 carries several tufts of bristles 18 which protrude through holes 20 in the head casing. Each  
20      tuft 18 is pivotably attached to the head 14 and is driven by a motor concealed within the handle 12, via a drive shaft concealed within the stem 16. The handle carries an on/off switch 22 and may also contain a battery to power the motor.

25      As is well known in the art, the stem 16 and head 14 can be removed from the handle 12 and interchanged with another head/stem unit so that the toothbrush can be used hygienically by different users. The joint  
30      between the stem and the handle 12 is denoted by reference numeral 24.

Turning now to Figure 2 of the drawings, in a known arrangement a toothbrush head comprises ten tufts of  
35      bristles 26 arranged in two rows designated A and B. Each tuft 26 is fixed at its base to a respective pinion wheel 28. Each pinion wheel 28 is in turn

pivotally mounted upon a spindle (not shown) whereby each tuft 26 can turn about a vertical axis as represented in the drawing.

5 A rack 30 lies between the rows A and B and is arranged to mesh with each pinion wheel 28, as shown by the dotted lines in the drawing. The rack 30 is driven in oscillatory fashion to and fro along its longitudinal axis and thus causes the pinion wheels  
10 28, and the tufts 26, to turn alternately clockwise and then anticlockwise.

Figures 3 and 4 show a preferred embodiment of this invention, in which tufts 26 and the pinion wheels 28  
15 are arranged in two rows A and B as before. However, the central pinion wheels 28A and 28B of each row each have Archimedes spiral gear portions 32A and 32B. Moreover, the rack 30 of the prior art is replaced by a drive shaft 34 having a worm gear 36 at its end. The  
20 worm gear 36 meshes with both Archimedes spiral helical gear portions 32A and 32B and thus drives the central pinion wheels 28A and 28B when the drive shaft 34 rotates. A further important difference over the prior art arrangement is that each pinion wheel 28 of  
25 a row is coupled to its neighbour(s) in the row and thus drive is transmitted from the central pinion wheels 28A and 28B to each pinion wheel of their respective rows. Again, dotted lines in the drawing indicate the drive links between the various  
30 components.

Several features of the invention will be apparent from the foregoing. For instance, there is no oscillatory motion and therefore there is little or no  
35 vibration in use. Wear is also reduced. Moreover, each pinion wheel 28 rotates in the opposite direction to its neighbour(s) in its row and also to its



5 counterpart in the opposite row. This contra-rotating arrangement gives an improved cleaning action and better balance. A further advantage of the invention is that the rotary motion of the drive shaft 34 can be derived directly from a motor situated in the handle of the toothbrush, with no need for intermediate cranks or the like to convert rotary motion to oscillatory motion.

10 Many variations to the embodiment described above are possible without departing from the scope of the present invention. For example, the helical gear portions need not be associated with the central pinion wheels but could instead be associated with  
15 pinion wheels at the ends of their respective rows. Furthermore, the pinion wheels could be grouped in arrangements other than rows.

20 It will be clear that although this invention has been described herein with reference to a toothbrush, the invention also covers brushes for other uses.

CLAIMS

- 5        1. A powered brush head comprising one or more  
movable tufts, wherein the or each tuft is drivable by  
rotary drive means for rotary motion relative to the  
head.
- 10       2. A powered brush head according to claim 1, having  
a group of tufts coupled to one another for  
transmission of drive through the group, at least one  
tuft of the group also being coupled to the rotary  
drive means.
- 15       3. A powered brush head according to claim 2, wherein  
the group of tufts is an elongate array and wherein a  
tuft at or near the centre of the array is coupled to  
the rotary drive means.
- 20       4. A powered brush head according to claim 2 or claim  
3, wherein each tuft of the group is associated with  
a pinion wheel, the pinion wheel being rotatably  
attached to the head, and wherein the coupling between  
25       respective tufts of the group is effected by meshing  
between the respective associated pinion wheels.
- 30       5. A powered brush head according to any of claims 2  
to 4, wherein each tuft of the group rotates in use in  
a direction opposite to the neighbouring tuft or tufts  
in the group.
- 35       6. A powered brush head according to any one of claims  
2 to 5, having at least two groups of tufts, at least  
one tuft of each group being coupled to common rotary  
drive means.

5 7. A powered brush head according to claim 6, wherein the groups of tufts are each linear arrays arranged side-by-side, and wherein a tuft in one of the arrays rotates in use in a direction opposite to a corresponding tuft in a neighbouring array.

10 8. A powered brush head according to any preceding claim, wherein the rotary drive means comprises a drive shaft carrying a worm gear.

9. A powered brush head according to claim 8, wherein the worm gear meshes with an Archimedes spiral gear associated with at least one of the tufts.

15 10. A brush incorporating a powered brush head according to any preceding claim.

20 11. A powered brush head substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.